

## Effect of Honey to Levels Hemoglobin and Levels of 8-Hydroxy-2-Deoxyguanosin (8-Ohdg) in Pregnant Women with Anemia

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### Abstract

Honey contains many nutrients including vitamins A, C, E, B12,  $\beta$ -carotene and phalvonoid which can increase hemoglobin and suppress oxidative stress. This study aims to determine the effect of honey administration on Hemoglobin Levels and 8-hydroxy-2-Deoxyguanosin (8-Ohdg) levels in pregnant women with anemia. This study uses a type of Quasi Experiment research with pretest-posttest research design, Sample in a study of 30 pregnant women divided into 2 groups, mothers who received Fe (Control Group) and Honey + Fe (Intervention Group) Implementation carried out for 60 days. Then blood and urine are taken to examine hemoglobin levels and 8-Ohdg levels. Data were analyzed using Paired Sample T Test and Independent T Test. The results showed an increase in hemoglobin levels in the intervention group Honey + Fe by  $(2.80 \pm 0.26\text{gr} / \text{dl})$  while the Fe control group was  $(0.80 \pm 0.13\text{gr} / \text{dl})$  with a value of  $p = 0,001 < 0, 05$ . The 8-Ohdg level in the intervention group Honey + Fe was  $(-4.23 \pm 1.32 \text{ nmol} / \text{ml} p = 0.031 < 0.05)$  while the Fe control group was  $(2.98 \pm 130 \text{ nmol} / \text{ml} p = 0.322 > 0, 05)$ . Based on the Independent T Test on hemoglobin levels, the values of  $p = 0,001 < 0,005$  and 8-Ohdg values obtained  $p$  value =  $0,002 < 0,05$ . Thus the group given Honey + Fe is more effective in increasing hemoglobin levels and decreasing levels of 8-Ohdg in anemic pregnant women.

**Keywords:** Honey, Pregnant Women, Hemoglobin Levels, 8-Ohgd

### Introduction

Honey is a naturally sweet substance produced by honey bees from the nectar of plant flowers or other parts of plants. Honey is an important food source for human nutrition because it contains 82.3% carbohydrates which is much higher than other livestock products. Besides containing sugar, honey also contains mineral salts, protein, and vitamins (Bogdanov, 2015). Honey is a unique product from animals, which contains various macro and micro nutrients as well as active ingredients that act as antioxidants. Contains essential nutrients such as iron (Fe) 0.42 mg, calcium (Ca) 200.00 mg and vitamin A 3.00 mg rich in -carotene, protein, vitamins A, C, E, and B (minerals, amino acids, pyro-doxin, reboflavin, pantothenic acid, biotin, vitamin B6 and vitamin B12). Various types of antioxidant compounds such as ascorbic acid, flavonoids, phenolics and carotenoids (Erejuwa et al., 2014).

Anemia is a condition characterized by a decrease in the number of red blood cells, hemoglobin levels, and hematocrit below normal (Arisman, 2007). Anemia in mothers is caused by iron deficiency because there is a two-fold increase in iron requirements in pregnant women for the formation of the placenta and during childbirth. Iron deficiency during the age period can lead to anemia, DNA synthesis, prolonged labor, postpartum hemorrhage, cognitive and physical development of children (Anggraini et al., 2017).

In addition, anemia can increase the risk for cesarean section in the mother and can have a negative impact on the neonate. However, this can be prevented through monitoring/correction of hemoglobin in late pregnancy to prevent unwanted events (Drukker et al., 2015). Thus, in pregnant women who experience anemia, there is an increase in oxidative stress which results in DNA damage. Another study using honey on hemoglobin levels, such as the study by Widiati (2014), by giving honey + Moringa to working mothers who have anemia can increase hemoglobin levels.

Research conducted by Chaiyasut et al (2011) stated that honey has an antioxidant effect that can react and neutralize free radicals, both in terms of induced DNA damage and due to excessive ROS production, so that by giving honey it can improve the quality of sperm. Honey contains many nutrients such as vitamins C, A, E, and various flavonoids that have antioxidant effects (Vallianou, 2014).

Research by Khuzaimah, et al (2015), on the effect of giving honey and Moringa extract on oxidative stress and birth weight in passive smoking pregnant women who were given an intervention for 90 days, honey contains antioxidants that can suppress oxidative stress so that there is a significant decrease in levels of 8- Ohgd.

One of the efforts made to prevent anemia and DNA damage is to utilize local plants that exist in the community, namely honey. Honey contains iron (Fe), vitamin C, vitamin B complex and folic acid which can help the formation of red blood cells. So that by consuming honey at the age of adolescents who suffer from anemia can help increase the formation of red blood cells and prevent anemia (Ristyning, 2016).

Based on the foregoing, this study aims to determine the effect of giving honey on hemoglobin levels and 8-Ohdg levels in anemic pregnant women.

## **Methods**

### **Research Design**

This study uses a quasi-experimental research design with a pretest-posttest research design with an intervention of 60 days of giving Honey+Fe to pregnant women with anemia at the Public Health Center of Perumnas Antang, Makassar City.

### **Population and Sample**

The population in this study were all pregnant women who were anemic at the Public Health Center of Perumnas Antang Makassar City. The sample in this study were all anemic pregnant women at the Public Health Center of Perumnas Antang Makassar City who met the inclusion criteria. as many as 30 respondents.

### **Data Collection**

Data collection technique is a method used to obtain data that supports research achievements. Data collection is done using primary data and secondary data. Primary data were obtained directly from pregnant women to obtain respondent data and were examined for hemoglobin levels and 8-Ohdg levels in pregnant women with anemia after a 2-month intervention at the Public Health Center of Perumnas Antang Makassar City in 2021. Makassar City Health.

### **Data Analysis Techniques**

Computerized data processing using the SPSS program. Data analysis was carried out systematically using univariate analysis and bivariate analysis (T test).

### **Results and Discussion**

## Sample Characteristics

Table 1. Demographic Characteristics

Characteristics of Respondents	Intervention		Control		Total	P Value
	N	%	N	%		
Mother's Age						
- Low Risk	12	80.0	11	73,3	15	0,186
- High Risk	3	20,0	4	26.7		
Education						
- Tall	5	4 5.5	6	54,5	15	1,000
- Low	10	52.6	9	47,4		
Mother's work						
- Low	4	57.1	3	42,9	15	1,000
- Tall	11	47,8	12	52.2		
Parity						
- Primi	6	40.0	5	33,3	15	1,000
- Multi	9	60.0	10	66.7		
Lila						
- Usual	6	40.0	6	40.0	15	1,000
- Abnormal	9	60.0	9	60.0		

Source: Primary Data 2021, Frequency Distribution, Chi Square Test;

Table 1 shows that in this study there was no significant difference between age, education, mother's occupation, parity, and Lila. In the intervention group and the control group ( $p > 0.05$ ), which means that all the characteristics used as research samples are not significantly different.

## Hemoglobin Levels

Table 2. Changes in H Levels of Hemoglobin of Pregnant Women Before and After Intervention in Both groups

Variable Hemoglobin	N	Mean $\pm$ Elementary School Hemoglobin		P	Difference
		Pre	Post		
Control	15	8.85 $\pm$ 9.36	11.65 $\pm$ 0.4	0.001 <sup>a</sup> 0.001 a	2.80 $\pm$ 0.26
Interventions	15	9.33 $\pm$ 0.91	10.13 $\pm$ 0.99		0.80 $\pm$ 0.13
P		0.171 <sup>b</sup>	0.001 <sup>b</sup>		0.001 <sup>b</sup>

<sup>a</sup>Paired Samples Test, <sup>b</sup>Independent Samples Test

Based on the data in Table 2, it shows that there was a change in the average hemoglobin level before treatment in the group that was only given Fe with a value of 9.33 g/dl, while the hemoglobin level after treatment in the control group was 10.13 g/dl. Based on the results of the Paired Samples Test, the P value of  $0.000 < = 0.05$ , this indicates that there is an effect of giving Fe in the control group to the increase in Hemogobin and Hemoglobin levels before treatment in the intervention group with a value of 8.85 gr/dl, while after treatment with value 11.65 gr/dl. Based on the results of the Paired Samples Test, the P value of  $0.000 < = 0.05$  shows that there is an effect of giving honey in the intervention group to the increase in hemoglobin levels.

Based on the data in the table shows that the significance value of the hemoglobin level variable is  $p = 0.000 < 0.05$ , this indicates a significant increase between the administration of Honey + Fe on hemoglobin levels in pregnant women.

### Levels of 8-Hydroxy-2-Deoxguanosine (8-Ohdg)

Table 3. Changes in Levels of 8Ohdg Pregnant Women Before and After Intervention in Both groups

Group	N	Mean ± Elementary School 8OHDG		P	Mean Difference
		Pre	Post		
Honey+Fe	15	20.19±4.78	15.96 ± 6.10	0.031 <sup>a</sup>	-4.23±1.32
e	15	22.18±7.04	25.16 ± 8.34	0.322 <sup>a</sup>	2.98±1.30
Fe		0.371 <sup>b</sup>	0.002 <sup>b</sup>		0.002 <sup>b</sup>
P					

<sup>a</sup>Paired Samples Test, <sup>b</sup>Independent Samples Test

Based on the data in Table 3 shows that Based on the results of the study obtained the average level of 8-Hydroxy-2-Deoxguanosine (8-Ohdg) before treatment in the group that was only given Fe with a value of 22.18 nmol/ml, while the levels of 8-Ohdg after treatment at control group with a value of 25.16 nmol/ml. Based on the results of the Paired Samples Test, a P value of 0.322 > = 0.05) showed that there was no effect of giving Fe in the control group to the decrease in 8-Ohdg levels and the average 8-Ohdg levels before treatment in the intervention group with a value of 20.19 nmol. /ml, while after treatment with a value of 15.96 nmol/ml. Based on the results of the Paired Samples Test, it was obtained that the P value was 0.031 < = 0.05, this indicates that there was an effect of giving honey in the intervention group to the reduction of 8-Ohdg levels.

Based on the data in the table shows that the significance value of the variable level of 8-Ohdg is p = 0.002 < 0.05, this indicates a significant decrease between the administration of honey and the level of 8-Ohdg pregnant women.

In this study, there was a significant relationship between the administration of Honey+Fe and hemoglobin levels where p=0.000<0.05 and an increase of 2.80 in the 0.80 Fe group. This study is in line with research conducted by Widiati (2014), that by giving honey to working mothers can increase hemoglobin levels where honey contains vitamin C, vitamin A, iron (Fe), and vitamin B12 which functions as the formation of red blood cells and hemoglobin. Research Islamiyah, et al (2017), states that honey can increase hemoglobin levels in adolescent girls and iron content can synthesize heme formation which can stimulate hemoglobin levels. Another content of honey that plays an important role in dissolving iron is vitamin C.

However, this study is different from Rista's (2014) study, which showed that there was no significant relationship between the administration of honey and an increase in hemoglobin levels in white rats even though there was an increase in hemoglobin in the group of white rats treated with 0.75 honey before administration of honey. The average Hb is 14.33 and after giving honey for 7 days the average value of Hb is 15.6, but in statistical tests there is still no significant increase.

The need for iron in pregnant women increases for the formation of the placenta and red blood cells and the preparation of blood that will be lost during childbirth. This increase in iron needs can reach 100-300%. Iron deficiency during the age period can cause anemia, DNA synthesis, prolonged labor, postpartum hemorrhage, cognitive and physical development of children (Anggraini et al., 2017).

Based on the results of this study, there was a significant decrease between the administration of Honey+Fe with 8-Ohdg levels where P = 0.002 < 0.05 and there was a decrease of 4.23

while the Fe group increased by 2.98. This is in line with the research conducted by Khuzaimah et al (2015), regarding the effect of giving honey and Moringa extract on oxidative stress and birth weight in passive smoking pregnant women who were given an intervention for 90 days, honey contains antioxidants that can suppress oxidative stress so that there is a significant decrease in 8-OHgd levels.

Research conducted by Chaiyasut et al (2011), states that honey has an antioxidant effect that can react and neutralize free radicals, both in terms of induced DNA damage and due to excessive ROS production, so that by giving honey it can improve the quality of sperm, Vallianou's research (2014), that honey content such as vitamins C, A, E, and various flavonoids have antioxidant effects.

Other studies have stated that in addition to these compounds, beta carotene is a compound that acts as an antioxidant contained in honey and is able to reduce free radicals. Parwata, et al (2010), The phenolic antioxidant substances contained in honey are more effective and can increase the body's resistance to oxidative stress, while other studies have stated that honey repairs oxidative stress by promoting Nrf2, an important intracellular transcription factor, evidence shows that honey can reduce oxidative stress. In addition, it also proves that the implications of oxidative stress and inflammation in the pathogenesis and complications of diabetes mellitus and hypertension (Erejuwa et al., 2014).

In pregnant women with anemia, the range of occurrence of increased oxidative stress due to reactive oxygen species (ROS) and nitrogen oxidative species (NOS). In pregnancy, in addition to iron deficiency, there is also a change in the respiratory system which functions to regulate the fulfillment of O<sub>2</sub> needs (Manuaba, 2010). At high oxygen demand for tissue oxygen which can result in increased oxidative stress. Oxidative stress occurs because reactive oxygen species (ROS) exceed the capacity of available antioxidants. Disruption in the balance of antioxidants and oxidants can cause damage (Okhiai et al., 2011).

DNA damage that occurs during pregnancy can cause IUGR, thus affecting pregnancy outcomes such as low birth weight. In this study, honey can reduce DNA damage (8-OHgd levels) with a P value = 0.003 <0.05, this indicates that the administration of natural antioxidants (honey) especially in the second trimester of pregnancy can prevent lipid peroxidation resulting in DNA damage.

Micronutrient intervention studies on DNA damage gave different results, influenced by various things such as nutritional and health status at the time of administration, supplement composition, dosage, dosage form (synthetic or natural) and environmental conditions such as temperature and oxygen conditions (Ao, 2013).

The honey used in this study contains antioxidant compounds (polyphenyl, flavonoid and phenol antioxidant activity of honey, it is also classified as having high antioxidant activity including phenolic and flavonoid. In addition, honey also has vitamins A, C, E amino acids, phenols and flavonoids which acts as an antioxidant and free radical scavenger (Astarika, 2011). Honey also contains bioactive elements such as a mixture of organic acids, carotenoid derivatives, nitric oxide (NO) metabolites, ascorbic acid, vitamins, proteins and a number of enzymes such as glucose oxidase, diastase, invertase, phosphatase, catalase, and peroxidase are also contained in honey (Bogdanov, 2015). The phenolic antioxidants contained in honey are more effective and can increase the body's resistance to oxidative stress. Al-'Id (2010), So by giving honey to the mother pregnant at a dose of 2x1 / day for 60 days can reduce levels of 8-OHgd.

## Conclusion

Based on the results, it can be concluded that there are differences in changes in hemoglobin levels and 8-OHdG levels before and after administration of Honey+Fe in the intervention group and Fe in the control group. It is hoped that future researchers will have a larger sample size.

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